1856MNRAS..16...59W

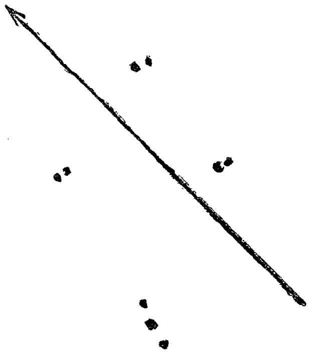
the ball upon the ring, have been made in some measure to satisfy the query of Professor Secchi, in his paper in No. 982 of the *Astronomische Nachrichten*. They do not appear to afford any evidence of oscillation of the plane of the ring. Neither have I been able to detect any want of symmetry in the form of the division. But the sky during the latter part of the autumn and winter has been remarkably unfavourable for delicate scrutiny.

"In addition to the above observations of *Saturn*, I may mention a

Remarkable Configuration of Stars

found on pointing the telescope in the neighbourhood of *Uranus*. Approximate place, hastily and rather rudely taken, R.A. $3^h\ 13^m$, P.D. 72° 50′. No opportunity was afforded of measuring any of the stars, or even correctly ascertaining their magnitudes. They appeared thus in the field of view with power 260:—

"The four principal stars are very bright, and of very nearly equal magnitude. The companions of the three forming the equilateral triangle are very minute, so as to form similar and extremely unequal double stars. The south following companion is a delicate object even with 24 inches' aperture. Some relation amongst them is suggested by their remarkable juxtaposition.



"*Bradstones, 9th January*, 1856."

On Occultations of Stars by Saturn. By M. Winnecke.

(*Extract of a Letter to the Astronomer Royal.*)

"You will excuse my troubling you with a remark on the subject of your note in the December Number of the *Monthly Notices*, relative to the occultation of a star by *Saturn*, which was pointed out in No. 920 of the *Astronomische Nachrichten*. I hardly think that the conjunction will result in a real occultation, since the ephemeris of *Saturn*, published in the *Nautical Almanac*, has given the declinations in recent years with far greater accuracy than the astronomical ephemeris of this place has done. Assuming the *Nautical Almanac* as the basis of computation, we find the geocentric declination of the centre of *Saturn* for the instant of conjunction in right ascension with the star $7\frac{1}{2}^m$ to be:—

$$\delta\ ♄ = +22^\circ\ 14'\ 6''$$

1856MNRAS..16...59W

"The American Ephemeris gives nearly the same value;—

δ ♄ = +22° 14′ 9″

"The apparent declination of Lalande 13545 is, however,—

δ ✱ = +22° 14′ 26″ (Bessel's Zone 279, Lal.)

"So that, probably, there will be only a close approach to an occultation. On the 13th of November, 1854, the sky was clear here. *Saturn,* as might be expected from the meridian observations of M. Bruhns (*Ast. Nach.* 922), remained to the south of Lal. 9362, without occulting it. It was very striking, however, on the occasion of this near conjunction to remark the faint light of this star of the 7.8 magnitude, compared with the light of *Titan,* which, it must be admitted, was farther removed from the planet. The star shone so feebly that it seems doubtful whether, apart from all other considerations, a star of the eighth magnitude would, from this circumstance alone, be visible in the space between the ring and the body of the planet.

"By extending my researches to the next year I have arrived at the remarkable conclusion, that, on the 29th of June, 1857, *Saturn* will, in all probability, almost centrally occult δ *Geminorum,* a star of the third magnitude. If we assume the apparent position of the star for this day to be,—

$\alpha = 7^h\ 11^m\ 35^s{\cdot}20 \qquad \delta = +22°\ 14'\ 37''{\cdot}0$

the different ephemerides assign for the moment of conjunction in right ascension,—

		h	m			°	′	″
Berliner Jahrbuch,	1857, June 29,	11	47	G.M.T.	Geoc. Dec. ♄ =	+22	14	48·0
Nautical Almanac	...	11	53	...	...	+22	14	34·5
American Ephemeris	...	12	3	...	...	+22	14	37·9

The Polar Semi-diameter of *Saturn* is 7″·9 (American Ephemeris).

"It is, indeed, very much to be regretted that a phenomenon of such rare occurrence, and one which might furnish important indications relative to the nature of the divisions of the ring, the transparency of the obscure ring and the perhaps oscillatory dimensions of the Saturnian system, can hardly be well observed. The position of the sun for the instant of conjunction is, in fact, $\alpha = 6^h\ 35^m$, $\delta = +23°\ 13'$. Notwithstanding this unfavourable circumstance, it may be hoped that in consequence of the brightness of the star, this phenomenon, although invisible to us, may be observed in the daytime by the aid of the powerful telescopes of the Observatories of Cambridge, U.S., and Washington.

"The rarity of the phenomenon is still further enhanced by the circumstance that δ *Geminorum* is a double star. If we regard the observation of the elder Herschel as probably erroneous, it will be found that the remaining measures do not exhibit any pronounced relative movement.

"Struve's data for the star are:—

Magnitude 3^{m}, $8^{m}\cdot2$ Dist. = $7''\cdot13$ Position Angle 197° 39′

whence it follows that the companion star precedes the principal star by $2''\cdot2$, and is farther south than it by $6''\cdot8$. If we now assume that the place given in the *Nautical Almanac* is exact, it results that the centre of *Saturn* will pass *between* both stars. Galle has found by calculations based on the doctrine of probabilities, that, taking into consideration all the stars down to the ninth magnitude, inclusive, *Saturn* will occult one of such stars only once in every 181 years. If we now assume, in round numbers, the number of these stars to be 200,000 (Humboldt, *Cosmos*, Band iii. s. 146), which will not be far from the truth, and estimate, according to the same authority, the number of stars included between the first and third magnitudes to be 275, it follows, upon the supposition of an uniform distribution of stars in the celestial vault, that *Saturn* occults a star of one of these three classes of magnitude only once in 130,000 years.

"The above number assigned by Galle is, however, liable to some objections. I have not quite at hand the work in which it is deduced, but I rather think that it holds good only for an observer situate on the sun; whence it would follow that if we consider an inhabitant of the earth, the number must be diminished; that is to say, the occultations by *Saturn* must be more abundant. At all events, many thousands of years will elapse before an equally bright star will be again occulted by *Saturn*, and more especially a double star.

"If this matter should appear of sufficient importance to you, I beg of you to have the goodness to communicate it to the Royal Astronomical Society.

"*Berlin, January* 28, 1856."

Places resulting from Observations of Recently Discovered Small Planets made with the Transit Circle, at the Royal Observatory, Greenwich, during the month of December 1855.

Iris.

Greenwich M.S. Time.		R.A.	N.P.D.
	h m s	h m s	° ′ ″
1855, Dec. 6	13 2 14·9	6 3 13·06	67 3 48·45
12	12 32 26·7	5 56 59·33	67 31 26·82
13	12 27 26·2	5 55 54·63	67 36 6·41
18	12 2 20·6	5 50 27·62	67 59 25·31
21	11 47 19·4	5 47 13·62	68 13 17·99